Do not open this Test Booklet until you are asked to do so

1. A seat marked with Reg. No. will be allotted to each student. The student should ensure that he/she occupies the correct seat only. If any student is found to have occupied the seat of another student, both the students shall be removed from the examination and shall have to accept any other penalty imposed upon them.

2. Duration of Test is 3 Hours and Questions Paper Contains 180 Questions. The Max. Marks are 720.

3. Student can not use log tables and calculators or any other material in the examination hall.

4. Student must abide by the instructions issued during the examination, by the invigilators or the centre incharge.

5. Before attempting the question paper ensure that it contains all the pages and that no question is missing.

6. Each correct answer carries 4 marks, while 1 mark will be deducted for every wrong answer. Guessing of answer is harmful.

7. A candidate has to write his / her answers in the OMR sheet by darkening the appropriate bubble with the help of Blue / Black Ball Point Pen only as the correct answer(s) of the question attempted.

8. Use of Pencil is strictly prohibited.

Note : In case of any Correction in the test paper, please mail to dlpcorrections@allen.ac.in within 2 days along with Paper code and Your Form No. 

Your Target is to secure Good Rank in Pre-Medical 2016
1. The energy of the electromagnetic waves is of the order of 15 keV. To which part of the spectrum does it belong?
   (1) γ-rays
   (2) X-rays
   (3) Infra-red rays
   (4) Ultraviolet rays

2. The refracting angle of a prism is A, and refractive index of the material of the prism is \( \cot(A/2) \). The angle of minimum deviation is:
   (1) \( 180^\circ - 2A \)
   (2) \( 90^\circ - A \)
   (3) \( 180^\circ + 2A \)
   (4) \( 180^\circ - 3A \)

3. A parallel beam of fast moving electrons is incident normally on a narrow slit. A fluorescent screen is placed at a large distance from the slit. If the speed of the electrons is increased, which of the following statements is correct?
   (1) The angular width of central maximum will be unaffected.
   (2) Diffraction pattern is not observed on the screen in the case of electrons.
   (3) The angular width of the central maximum of the diffraction pattern will increase.
   (4) The angular width of the central maximum will decrease.

4. There are four light-weight rod samples A,B,C,D separately suspended by threads. A bar magnet is slowly brought near each sample and the following observations are noted:
   (i) A is feebly repelled
   (ii) B is feebly attracted
   (iii) C is strongly attracted
   (iv) D remains unaffected
   Which one of the following is true?
   (1) B is of a paramagnetic material
   (2) C is of a diamagnetic material
   (3) D is of a ferromagnetic material
   (4) A is of a non-magnetic material

5. The work function of a surface of a photosensitive material is 6.2 eV. The wavelength of the incident radiation for which the stopping potential is 5V lies in the:
   (1) Infrared region
   (2) X-ray region
   (3) Ultraviolet region
   (4) Visible region
6. If vectors \( \vec{A} = \cos \omega t \hat{i} + \sin \omega t \hat{j} \) and
\( \vec{B} = \cos \frac{\omega t}{2} \hat{i} + \sin \frac{\omega t}{2} \hat{j} \) are functions of time, then
the value of \( t \) at which they are orthogonal to each other is:

(1) \( t = 0 \)
(2) \( t = \frac{\pi}{4\omega} \)
(3) \( t = \frac{\pi}{2\omega} \)
(4) \( t = \frac{\pi}{\omega} \)

7. The force 'F' acting on a particle of mass 'm' is indicated by the force-time graph shown below. The change in momentum of the particle over the time interval from zero to 8 s is:

\[ F(t) \begin{cases} \text{N} \\ \text{s} \end{cases} \]
\[ t \begin{cases} \text{s} \end{cases} \]

(1) 24 Ns
(2) 20 Ns
(3) 12 Ns
(4) 6 Ns

8. A train moving at a speed of 220 ms\(^{-1}\) towards a stationary object, emits a sound of frequency 1000Hz. Some of the sound reaching the object gets reflected back to the train as echo. The frequency of the echo as detected by the driver of the train is:

(speed of sound in air is 330 ms\(^{-1}\))

(1) 5000 Hz
(2) 3000 Hz
(3) 3500 Hz
(4) 4000 Hz

9. 4.0 g of a gas occupies 22.4 litres at NTP. The specific heat capacity of the gas at constant volume is 5.0 JK\(^{-1}\) mol\(^{-1}\). If the speed of sound in this gas at NTP is 952 ms\(^{-1}\), then the specific heat capacity at constant pressure is:

(Take gas constant \( R = 8.3 \) JK\(^{-1}\) mol\(^{-1}\))

(1) 8.5 JK\(^{-1}\) mol\(^{-1}\)
(2) 8.0 JK\(^{-1}\) mol\(^{-1}\)
(3) 7.5 JK\(^{-1}\) mol\(^{-1}\)
(4) 7.0 JK\(^{-1}\) mol\(^{-1}\)
10. The ratio of the radii of gyration of a circular disc to that of a circular ring, each of same mass and radius around their respective axes passing through centre is:

(1) $\sqrt{2} : 1$
(2) $\sqrt{2} : \sqrt{3}$
(3) $\sqrt{3} : \sqrt{2}$
(4) $1 : \sqrt{2}$

11. Two vessels separately contain two ideal gases $A$ and $B$ at the same temperature, the pressure of $A$ being twice that of $B$. Under such conditions, the density of $A$ is found to be 1.5 times the density of $B$. The ratio of molecular weight of $A$ and $B$ is:

(1) $\frac{1}{2}$
(2) $\frac{2}{3}$
(3) $\frac{3}{4}$
(4) $\frac{4}{3}$

12. The resistance in the two arms of the meter bridge are $5\Omega$ and $R\Omega$, respectively. When the resistance $R$ is shunted with an equal resistance, the new balance point is at $1.6\,\ell_1$. The resistance ‘$R$’ is:

(1) $10\Omega$
(2) $15\Omega$
(3) $20\Omega$
(4) $25\Omega$

13. The dimensions of $(\mu_0\varepsilon_0)^{-1/2}$ are:

(1) $[L \, T^{-1}]$
(2) $[L^{1/2} T^{1/2}]$
(3) $[L^{1/2} T^{-1/2}]$
(4) $[L^{-1} T]$
15. A vertical spring with force constant $K$ is fixed on a table. A ball of mass $m$ at a height $h$ above the free upper end of the spring falls vertically on the spring so that the spring is compressed by a distance $d$. The net work done in the process is:

1. $mg(h-d) + \frac{1}{2}Kd^2$
2. $mg(h+d) + \frac{1}{2}Kd^2$
3. $mg(h+d) - \frac{1}{2}Kd^2$
4. $mg(h-d) - \frac{1}{2}Kd^2$

16. Two particles A and B, move with constant velocities $\vec{v}_1$ and $\vec{v}_2$. At the initial moment their position vectors are $\vec{r}_1$ and $\vec{r}_2$ respectively. The condition for particle A and B for their collision is:

1. $\vec{r}_1 - \vec{r}_2 = \vec{v}_1 - \vec{v}_2$
2. $\vec{r}_1 - \vec{r}_2 = \vec{v}_2 - \vec{v}_1$
3. $\vec{r}_1 \cdot \vec{v}_1 = \vec{r}_2 \cdot \vec{v}_2$
4. $\vec{r}_1 \times \vec{v}_1 = \vec{r}_2 \times \vec{v}_2$

17. A transformer having efficiency of 90% is working on 200V and 3kW power supply. If the current in the secondary coil is 6A, the voltage across the secondary coil and the current in the primary coil respectively are:

1. 300 V, 15A
2. 450 V, 15A
3. 450V, 13.5A
4. 600V, 15A

18. An alternating electric field, of frequency $\nu$, is applied across the dees (radius = R) of a cyclotron that is being used to accelerate protons (mass = m). The operating magnetic field (B) used in the cyclotron and the kinetic energy (K) of the proton beam, produced by it, are given by:

1. $B = \frac{2mv}{e}$ and $K = 2m\nu^2R^2$
2. $B = \frac{mv}{e}$ and $K = m^2\nu R^2$
3. $B = \frac{mv}{e}$ and $K = 2m\nu^2R^2$
4. $B = \frac{2mv}{e}$ and $K = m^2\nu R^2$
19. The electric field at a distance $\frac{3R}{2}$ from the centre of a charged conducting spherical shell (hollow) of radius $R$ is $E$. The electric field at a distance $\frac{R}{2}$ from the centre of the sphere is $-$:

(1) $E$ (2) $\frac{E}{2}$ (3) $\frac{E}{3}$ (4) Zero

20. A wheel has angular acceleration of $3.0 \text{ rad/sec}^2$ and initial angular speed of $2.00 \text{ rad/sec}$. In a time of $2 \text{ sec}$ it has rotated through an angle (in radian) of:

(1) 4 (2) 6 (3) 10 (4) 12

21. Water rises to height 'h' in capillary tube. If the length of capillary tube above the surface of water is made less than 'h', then -

(1) water does not rise at all.
(2) water rises upto the tip of capillary tube and then starts overflowing like a fountain.
(3) water rises upto the top of capillary tube and stays there without overflowing.
(4) water rises upto a point a little below the top and stays there.

22. A certain number of spherical drops of a liquid of radius 'r' coalesce to form a single drop of radius 'R' and volume 'V'. If 'T' is the surface tension of the liquid, then:

(1) energy $= 4VT\left(\frac{1}{r} - \frac{1}{R}\right)$ is released
(2) energy $= 3VT\left(\frac{1}{r} + \frac{1}{R}\right)$ is absorbed
(3) energy $= 3VT\left(\frac{1}{r} - \frac{1}{R}\right)$ is released
(4) Energy is neither released nor absorbed

23. The figure shown a logic circuit two inputs A and B and the output C. The voltage wave forms across A, B and C are as given. The logic circuit gate is:

(1) AND gate (2) NAND gate (3) OR gate (4) NOR gate
24. A circular disk of moment of inertia $I_t$ is rotating in a horizontal plane, about its symmetry axis, with a constant angular speed $\omega$. Another disk of moment of inertia $I_b$ is dropped coaxially onto the rotating disk. Initially the second disk has zero angular speed. Eventually both the disks rotate with a constant angular speed $\omega_f$. The energy lost by the initially rotating disc to friction is:

\[
\begin{align*}
1. & \quad \frac{I_b}{2(l_1 + l_b)} \omega_1^2 \\
2. & \quad \frac{I_t}{2(l_1 + l_t)} \omega_t^2 \\
3. & \quad \frac{l_b - l_t}{2(l_1 + l_b)} \omega_t^2 \\
4. & \quad -\frac{l_b - l_t}{2(l_1 + l_b)} \omega_t^2
\end{align*}
\]

25. In the energy band diagram of a material shown below, the open circles and filled circles denote holes and electrons respectively. The material is:

- (1) an n-type semiconductor
- (2) a p-type semiconductor
- (3) an insulator
- (4) a metal

26. A particle of unit mass undergoes one-dimensional motion such that its velocity varies according to

\[v(x) = \beta x^{-2n}\]

where $\beta$ and $n$ are constants and $x$ is the position of the particle. The acceleration of the particle as a function of $x$, is given by:

\[
\begin{align*}
1. & \quad -2n\beta^2 x^{-4n-1} \\
2. & \quad -2\beta^2 x^{-2n+1} \\
3. & \quad -2n\beta^2 e^{-4n+1} \\
4. & \quad -2n\beta^2 x^{-2n-1}
\end{align*}
\]

27. Ratio of longest wavelengths corresponding to Lyman and Balmer series in hydrogen spectrum is:

\[
\begin{align*}
1. & \quad \frac{9}{31} \\
2. & \quad \frac{5}{27} \\
3. & \quad \frac{3}{23} \\
4. & \quad \frac{7}{29}
\end{align*}
\]
28. If the radius of a star is \( R \) and it acts as a black body, what would be the temperature of the star, in which the rate of energy production is \( Q \)? (\( \sigma \) stands for Stefan's constant.)

(1) \( \frac{4\pi R^2 Q}{\sigma} \)\(^{1/4} \)
(2) \( \frac{Q}{4\pi R^2 \sigma} \)\(^{1/4} \)
(3) \( \frac{Q}{4\pi R^2 \sigma} \)
(4) \( \frac{Q}{4\pi R^2 \sigma} \)\(^{-1/2} \)

29. Two particles which are initially at rest, move towards each other under the action of their internal attraction. If their speeds are \( v \) and \( 2v \) at any instant, then the speed of centre of mass of the system will be:

(1) \( v \)
(2) \( 2v \)
(3) Zero
(4) \( 1.5v \)

30. The binding energy of deuteron is 2.2 MeV and that of \( _2^4 \text{He} \) is 28 MeV. If two deuterons are fused to form one \( _2^4 \text{He} \) then the energy released is:

(1) 25.8 MeV
(2) 23.6 MeV
(3) 19.2 MeV
(4) 30.2 MeV

31. One mole of an ideal diatomic gas undergoes a transition from A to B along a path AB as shown in the figure.

The change in internal energy of the gas during the transition is:

(1) \(-20 \text{ kJ}\)
(2) 20 J
(3) \(-12 \text{ kJ}\)
(4) 20 kJ

32. A plano convex lens fits exactly into a plano concave lens. Their plane surfaces are parallel to each other. If lenses are made of different materials of refractive indices \( \mu_1 \) and \( \mu_2 \) and \( R \) is the radius of curvature of the curved surface of the lenses, then the focal length of combination is

(1) \( \frac{2R}{(\mu_2 - \mu_1)} \)
(2) \( \frac{R}{2(\mu_1 + \mu_2)} \)
(3) \( \frac{R}{2(\mu_1 - \mu_2)} \)
(4) \( \frac{R}{(\mu_1 - \mu_2)} \)
33. A particle of mass M is situated at the centre of a spherical shell of same mass and radius a. The magnitude of the gravitational potential at a point situated at $\frac{a}{2}$ distance from the centre, will be:

(1) $-\frac{GM}{a}$
(2) $-2\frac{GM}{a}$
(3) $-\frac{3GM}{a}$
(4) $-\frac{4GM}{a}$

34. In the given circuit the reading of voltmeter $V_1$ and $V_2$ are 300 volts each. The reading of the voltmeter $V_3$ and ammeter A are respectively:

(1) 100 V, 2.0 A
(2) 150 V, 2.2 A
(3) 220 V, 2.2 A
(4) 220 V, 2.0 A

35. A square surface of side L metres is in the plane of the paper. A uniform electric field $\vec{E}$ (volt/m), also in the plane of the paper, is limited only to the lower half of the square surface, (see figure). The electric flux in SI units associated with the surface is:

(1) $E \frac{L^2}{2\varepsilon_0}$
(2) $E \frac{L^2}{2}$
(3) Zero
(4) $E L^2$

36. A parallel plate air capacitor of capacitance C is connected to a cell of emf V and then disconnected from it. A dielectric slab of dielectric constant K, which can just fill the air gap of the capacitor, is now inserted in it. Which of the following is incorrect?

(1) The energy stored in the capacitor decreases K times.
(2) The change in energy stored is $\frac{1}{2}C(1 - \frac{1}{K})$. 
(3) The charge on the capacitor is not conserved.
(4) The potential difference between the plates decreases K times.
37. A wave travelling in the +ve x-direction having displacement along y-direction as 1m, wavelength 2π m and frequency of \( \frac{1}{\pi} \) Hz is represented by:

(1) \( y = \sin (2\pi x + 2\pi t) \)
(2) \( y = \sin (x - 2\pi) \)
(3) \( y = \sin (2\pi x - 2\pi t) \)
(4) \( y = \sin (10\pi x - 20\pi t) \)

38. A projectile is fired at an angle of 45° with the horizontal. The highest point as seen from the point of projection, is:

(1) 45°
(2) 60°
(3) \( \tan^{-1} \left( \frac{1}{2} \right) \)
(4) \( \tan^{-1} \left( \frac{\sqrt{3}}{2} \right) \)

39. A wire of resistance 12 ohms per meter is bent to form a complete circle of radius 10 cm. The resistance between its two diametrically opposite points, A and B as shown in the figure, is:

(1) 6Ω
(2) 0.6πΩ
(3) 3Ω
(4) 6πΩ

40. Which one of the following statements is true for the speed 'v' and the acceleration 'a' of a particle executing simple harmonic motion:

(1) Value of a is zero, whatever may be the value of 'v'.
(2) When 'v' is zero, a is zero.
(3) When 'v' is maximum, a is zero.
(4) When 'v' is maximum, a is maximum.

41. A block A of mass \( m_1 \) rests on a horizontal table. A light string connected to it passes over a frictionless pulley at the edge of table and from its other end another block B of mass \( m_2 \) is suspended. The coefficient of kinetic friction between the block and the table is \( \mu_k \). When the block A is sliding on the table, the tension in the string is:

(1) \( \frac{(m_2 - \mu_k m_1)g}{(m_1 + m_2)} \)
(2) \( \frac{m_1 m_2 (1 + \mu_k)g}{(m_1 + m_2)} \)
(3) \( \frac{m_1 m_2 (1 - \mu_k)g}{(m_1 + m_2)} \)
(4) \( \frac{(m_1 + \mu_k m_2)g}{(m_1 + m_2)} \)

40. Which one of the following statements is true for the speed 'v' and the acceleration 'a' of a particle executing simple harmonic motion:

(1) Value of a is zero, whatever may be the value of 'v'.
(2) When 'v' is zero, a is zero.
(3) When 'v' is maximum, a is zero.
(4) When 'v' is maximum, a is maximum.

41. When the block A is sliding on the table, the speed 'v' and the acceleration 'a' of a particle executing simple harmonic motion are represented by:

(1) \( v = \sin (2\pi x + 2\pi t) \)
(2) \( v = \sin (x - 2\pi) \)
(3) \( v = \sin (2\pi x - 2\pi t) \)
(4) \( v = \sin (10\pi x - 20\pi t) \)

37. \( \text{H-9/39} \)
42. In Young’s double slit experiment, the slits are 2mm apart and are illuminated by photons of two wavelengths \( \lambda_1 = 12000 \text{Å} \) and \( \lambda_2 = 10000 \text{Å} \). At what minimum distance from the common central bright fringe on the screen 2m from the slit will a bright fringe from one interference pattern coincide with a bright fringe from the other?
(1) 3 mm  
(2) 8 mm  
(3) 6 mm  
(4) 4 mm  

43. Two radioactive nuclei P and Q in a given sample decay into a stable nucleus R. At time \( t = 0 \), number of P species are \( 4N_0 \) and that of Q are \( N_0 \). Half-life of P (for conversion to R) is 1 minute whereas that of Q is 2 minutes. Initially there are no nuclei of R present in the sample. When number of nuclei of P and Q are equal, the number of nuclei of R present in the sample would be:
(1) \( 2N_0 \)  
(2) \( 3N_0 \)  
(3) \( \frac{9N_0}{2} \)  
(4) \( \frac{5N_0}{2} \)  

44. A galvanometer of resistance 50Ω is connected to a battery of 3V alongwith a resistance of 2950Ω in series. A full scale deflection of 30 divisions is obtained in the galvanometer. In order to reduce this deflection to 20 division, the resistance in series should be:
(1) 6050Ω  
(2) 4450Ω  
(3) 5050Ω  
(4) 5550Ω  

45. If \( \lambda_m \) denotes the wavelength at which the radiative emission from a black body at a temperature \( T \) is maximum, then:
(1) \( \lambda_m \) is independent of \( T \)  
(2) \( \lambda_m \propto T \)  
(3) \( \lambda_m \propto T^{-1} \)  
(4) \( \lambda_m \propto T^4 \)
46. The value of Planck's constant is \(6.63 \times 10^{-34}\) Js. The velocity of light is \(3.0 \times 10^8\) ms\(^{-1}\). Which value is closest to the wavelength in metres of a quantum of light with frequency of \(8 \times 10^{15}\) s\(^{-1}\)?

(1) \(2 \times 10^{-25}\)
(2) \(5 \times 10^{-18}\)
(3) \(3.75 \times 10^{-8}\)
(4) \(3 \times 10^7\)

47. The freezing point depression constant for water is \(+1.86^\circ\)C m\(^{-1}\). If 5.00 g Na\(_2\)SO\(_4\) is dissolved in 45.0 g H\(_2\)O, the freezing point is changed by \(-3.82^\circ\)C. Calculate the van't Hoff factor for Na\(_2\)SO\(_4\)

(1) 2.05
(2) 2.63
(3) 3.11
(4) 0.381

48. Reaction by which Benzaldehyde cannot be prepared:

(1) \(\text{COOH} + \text{Zn/Hg} \text{ and conc. HCl}\)

(2) \(\text{CH}_3 + \text{CrO}_2\text{Cl}_2 \text{ in CS}_2 \text{ followed by hydrolysis}\)

(3) \(\text{COCl} + \text{H}_2 \text{ in presence of Pd} + \text{BaSO}_4\)

(4) \(\text{CO} + \text{HCl} \text{ in presence of anhydrous AlCl}_3\)

49. The configuration of the compound \(\text{Br} + \text{C} = \text{H} + \text{Cl}\) is

(1) E
(2) R
(3) S
(4) Z

50. Which one of the following does not correctly represent the correct order of the property indicated against it?

(1) Ti < V < Cr < Mn : increasing melting points
(2) Ti < V < Mn < Cr : increasing 2\(^\text{nd}\) ionization enthalpy
(3) Ti < V < Cr < Mn : increasing number of oxidation states
(4) Ti\(^{3+}\) < V\(^3\) < Cr\(^{3+}\) < Mn\(^{3+}\) : increasing magnetic moment
51. One mole of an ideal gas at an initial temperature of T K does 6 R joules of work adiabatically. If the ratio of specific heats of this gas at constant pressure and at constant volume is \( \frac{5}{3} \), the final temperature of gas will be :-
(1) \( (T - 2.4) \) K  (2) \( (T + 4) \) K  
(3) \( (T - 4) \) K  (4) \( (T + 2.4) \) K

52. The electrode potentials for
\[ \text{Cu}^{2+} (aq) + e^- \rightarrow \text{Cu}^+ (aq) \]
and \[ \text{Cu}^+ (aq) + e^- \rightarrow \text{Cu(s)} \]
are +0.15 V and +0.50 V respectively. The value of \( E^{\circ}_{\text{Cu}^{2+}/\text{Cu}} \) will be :-
(1) 0.500 V  (2) 0.325 V  
(3) 0.650 V  (4) 0.150 V

53. Which one of the following sets forms the biodegradable polymer ?
(1) HO–CH₂–CH₂–OH & HOOC–(O)–COOH 
(2) CH = CH₂ & CH₂ = CH – CH = CH₂ 
(3) CH₂ = CH – CN & CH₂ = CH – CH = CH₂ 
(4) H₂N–CH₂–COOH & H₂N–(CH₂)₅–COOH

54. Which of the following is not the product of dehydration of \( \text{HO–CH} \)?

55. Four diatomic species are listed below. Identify the correct order in which the bond order is increasing in them :
(1) \( \text{C}_2 \)²⁻ < \( \text{He}_2 \)⁺ < \( \text{O}_2 \)⁻ < \( \text{NO} \)
(2) \( \text{He}_2 \)⁺ < \( \text{O}_2 \)⁻ < \( \text{NO} < \text{C}_2 \)²⁻
(3) \( \text{NO} < \text{O}_2 \)⁻ < \( \text{C}_2 \)²⁻ < \( \text{He}_2 \)⁺
(4) \( \text{O}_2 \)⁻ < \( \text{NO} < \text{C}_2 \)²⁻ < \( \text{He}_2 \)⁺

56. In a face-centered cubic lattice, a unit cell is shared equally by how many unit cells :-
(1) 4  (2) 2  (3) 6  (4) 8
57. Which has the maximum number of molecules among the following?
   (1) 64 g SO₂  
   (2) 44 g CO₂  
   (3) 48 g O₃  
   (4) 8 g H₂

58. In a set of reactions m-bromobenzoic acid gave a product D. Identify the product D.

   \[
   \text{COOH} \quad \xrightarrow{\text{SOCl}_2} \quad \text{Br} \quad \xrightarrow{\text{NH}_3} \quad \text{C} \quad \text{NaOH} \quad \xrightarrow{\text{Br}_3} \quad \text{D}
   \]

59. Artificial sweetener which is stable under cold conditions only is:
   (1) Saccharine  
   (2) Sucralose  
   (3) Aspartame  
   (4) Alitame

60. Which of the following does not give oxygen on heating?
   (1) (NH₄)₂Cr₂O₇  
   (2) KClO₃  
   (3) Zn(ClO₃)₂  
   (4) K₂Cr₂O₇

61. A plot of log x/m versus log p for the adsorption of a gas on a solid gives a straight line with slope equal to:
   (1) − log K  
   (2) n  
   (3) \(\frac{1}{n}\)  
   (4) log K

62. pH of a saturated solution of Ba(OH)₂ is 12. The value of solubility product (Kₛₚ) of Ba(OH)₂ is:
   (1) 4.0 × 10⁻⁶  
   (2) 5.0 × 10⁻⁶  
   (3) 3.3 × 10⁻⁷  
   (4) 5.0 × 10⁻⁷

63. The IUPAC name of the compound CH₃CH=CH=C=CH is:
   (1) Pent-3-en-1-yn  
   (2) Pent-2-en-4-yn  
   (3) Pent-1-yn-3-ene  
   (4) Pent-4-yn-2-ene
64. Name the type of the structure of silicate in which one oxygen atom of \([\text{SiO}_4]^4-\) is shared?
   (1) Linear chain silicate
   (2) Sheet silicate
   (3) Pyrosilicate
   (4) Three dimensional silicate

65. \(\text{XeF}_2\) is isostructural with:
   (1) \(\text{BaCl}_2\)
   (2) \(\text{TeF}_2\)
   (3) \(\text{ICl}_2\)
   (4) \(\text{SbCl}_3\)

66. In a first order reaction \(A \rightarrow B\), if \(k\) is rate constant and initial concentration of the reactant \(A\) is 0.5 M then the half-life is:
   (1) \(\ln 2 \over k\)
   (2) \(0.693 \over 0.5k\)
   (3) \(\log 2 \over k\)
   (4) \(\log 2 \over k\sqrt{0.5}\)

67. \(p_a\) and \(p_b\) are the vapour pressure of pure liquid components, \(A\) and \(B\), respectively of an ideal binary solution. If \(x_A\) represents the mole fraction of component \(A\), the total pressure of the solution will be:
   (1) \(p_a + x_A(p_b - p_a)\)
   (2) \(p_b + x_A(p_a - p_b)\)
   (3) \(p_a + x_A(p_B - p_A)\)
   (4) \(p_a + x_A(p_a - p_b)\)

68. In the following reaction
   \[\text{C}_6\text{H}_5\text{CH}_2\text{Br} \xrightarrow{1\text{Mg, Ether, 2H}_2\text{O}} X\]
   the product 'X' is:
   (1) \(\text{C}_6\text{H}_5\text{CH}_2\text{OH}\)
   (2) \(\text{C}_6\text{H}_5\text{CH}_3\)
   (3) \(\text{C}_6\text{H}_5\text{CH}_2\text{CH}_2\text{C}_6\text{H}_5\)
   (4) \(\text{C}_6\text{H}_5\text{CH}_2\text{OCH}_2\text{CH}_5\)

69. Which of the following elements is present as the impurity to the maximum extent in the pig iron?
   (1) Manganese
   (2) Carbon
   (3) Silicon
   (4) Phosphorus

70. Copper sulphate dissolves in excess of KCN to give
   (1) \(\text{CuCN}\)
   (2) \([\text{Cu(CN)}_4]^3-\)
   (3) \([\text{Cu(CN)}_4]^2-\)
   (4) \(\text{Cu(CN)}_2\)

71. At 10°C the value of the density of a fixed mass of an ideal gas divided by its pressure is \(x\). At 110°C this ratio is:
   (1) \(\frac{10}{110}x\)
   (2) \(\frac{283}{383}x\)
   (3) \(x\)
   (4) \(\frac{383}{283}x\)
72. A metal has a fcc lattice. The edge length of the unit cell is 404 pm. The density of the metal is 2.72g cm$^{-3}$. The molar mass of the metal is:

\[ (N_A \text{ Avogadro constant} = 6.02 \times 10^{23} \text{ mol}^{-1}) \]

1. 20g mol$^{-1}$
2. 40g mol$^{-1}$
3. 30g mol$^{-1}$
4. 27g mol$^{-1}$

73. Aniline in a set of the following reactions yielded a coloured product 'Y'

\[ \text{NH}_2 \overset{\text{NaNO}_2, \text{HCl}}{\text{(273-278K)}} \rightarrow \text{N,N-dimethylaniline} \]

The structure of 'Y' would be:

1. CH$_3$
2. CH$_3$
3. CH$_3$
4. CH$_3$

74. Among the elements Ca, Mg, P and Cl, the order of increasing atomic radii is:

1. Cl < P < Mg < Ca
2. P < Cl < Ca < Mg
3. Ca < Mg < P < Cl
4. Mg < Ca < Cl < P

75. The correct order of increasing thermal stability of K$_2$CO$_3$, MgCO$_3$, CaCO$_3$ and BeCO$_3$ is:

1. K$_2$CO$_3$ < MgCO$_3$ < CaCO$_3$ < BeCO$_3$
2. BeCO$_3$ < MgCO$_3$ < K$_2$CO$_3$ < CaCO$_3$
3. BeCO$_3$ < K$_2$CO$_3$ < MgCO$_3$ < CaCO$_3$
4. MgCO$_3$ < BeCO$_3$ < CaCO$_3$ < K$_2$CO$_3$

76. Oxidation numbers of P in PO$_4^{3-}$, S in SO$_4^{2-}$and that of Cr in Cr$_2$O$_7^{2-}$ are respectively:

1. -3, +6 and +6
2. +5, +6 and +6
3. +3, +6 and +5
4. +5, +3 and +6

77. In the reaction with HCl, an alkene reacts in accordance with the Markovnikov's rule, to give a product 1-chloro-1-methylecyclohexane. The possible alkene is:

1. (A)
2. (B)
3. (1) and (2)
4. (3) (1) and (2)

78. In the reaction with HCl, an alkene reacts in:

1. (A)
2. (B)
3. (1) and (2)
4. (3) (1) and (2)

79. Oxidation numbers of P in:

1. +3, +6 and +5
2. +5, +3 and +6
3. +3, +6, +5 and +6
4. +3, +6, +5 and +6

80. Among the elements Ca, Mg, P and Cl, the order of increasing atomic radii is:

1. Cl < P < Mg < Ca
2. P < Cl < Ca < Mg
3. Ca < Mg < P < Cl
4. Mg < Ca < Cl < P

81. Oxidation numbers of P in:

1. +3, +6 and +5
2. +5, +3 and +6
3. +3, +6, +5 and +6
4. +3, +6, +5 and +6

82. In the reaction with HCl, an alkene reacts in:

1. (A)
2. (B)
3. (1) and (2)
4. (3) (1) and (2)

83. Among the elements Ca, Mg, P and Cl, the order of increasing atomic radii is:

1. Cl < P < Mg < Ca
2. P < Cl < Ca < Mg
3. Ca < Mg < P < Cl
4. Mg < Ca < Cl < P
78. Benzene reacts with CH$_3$Cl in the presence of anhydrous AlCl$_3$ to form:-
(1) Xylene  (2) Toluene  
(3) Chlorobenzene  (4) Benzylchloride

79. Which one of the following is present as an active ingredient in bleaching powder for bleaching action?
(1) CaOCl$_2$  (2) Ca(OCl)$_2$  
(3) CaO$_2$Cl  (4) CaCl$_2$

80. Which one of the following ions is the most stable in aqueous solution?
(1) Mn$^{3+}$  (2) Cr$^{3+}$  
(3) V$^{3+}$  (4) Ti$^{3+}$  
(At. No. Ti = 22, V = 23, Cr = 24, Mn = 25)

81. An increase in equivalent conductance of a strong electrolyte with dilution is mainly due to:-
(1) Increase in number of ions  
(2) Increase in ionic mobility of ions  
(3) 100% ionisation of electrolyte at normal dilution  
(4) Increase in both i.e. number of ions and ionic mobility of ions

82. Which of the following is the most correct electron displacement for a nucleophilic reaction to take place?

83. The stability of carbanions in the following:

(a) R–C=C$^-$  (b)  
(c) R$_2$C=CH$^-$  (d) R$_3$C–CH$_2$$^-$

is in the order of:-
(1) (d) > (b) > (c) > (a)  
(2) (a) > (c) > (b) > (d)  
(3) (a) > (b) > (c) > (d)  
(4) (b) > (c) > (d) > (a)
84. Identify the wrong statement in the following:
   (1) Atomic radius of the elements increases as one moves down the first group of the periodic table.
   (2) Atomic radius of the elements decreases as one moves across from left to right in the 2nd period of the periodic table.
   (3) Amongst isoelectronic species, smaller the positive charge on the cation, smaller is the ionic radius.
   (4) Amongst isoelectronic species, greater the negative charge on the anion, larger is the ionic radius.

85. The straight chain polymer is formed by: –
   (1) Hydrolysis of (CH\(_3\))\(_2\)SiCl\(_2\) followed by condensation polymerisation.
   (2) Hydrolysis of (CH\(_3\))\(_3\)SiCl followed by condensation polymerisation.
   (3) Hydrolysis of CH\(_3\)SiCl\(_3\) followed by condensation polymerisation.
   (4) Hydrolysis of (CH\(_3\))\(_4\)Si by addition polymerisation.

86. In which of the following equilibrium \(K_c\) and \(K_p\) are not equal?
   (1) \(2C(s) + O_2(g) \rightleftharpoons 2CO(g)\)
   (2) \(2NO(g) \rightleftharpoons N_2(g) + O_2(g)\)
   (3) \(SO_2(g) + NO_2(g) \rightleftharpoons SO_3(g) + NO(g)\)
   (4) \(H_2(g) + I_2(g) \rightleftharpoons 2HI(g)\)

87. D(+) glucose reacts with hydroxylamine and yields an oxime. The structure of the oxime would be:

   1. CH = NOH
   2. H – C – OH
   3. HO – C – H
   4. HO – C – H
   5. H – C – OH
   6. CH\(_2\)OH

   1. CH = NOH
   2. H – C – OH
   3. HO – C – H
   4. HO – C – H
   5. H – C – OH
   6. CH\(_2\)OH
88. In the reaction

$$\text{CH}_3$$
$$\text{CH}_3-\text{CH}-\text{CH}_2-\text{O}-\text{CH}_2-\text{CH}_3 + \text{HI} \xrightarrow{\text{Heat}} \ldots$$

Which of the following compounds will be formed?

1. $\text{CH}_3-\text{CH}-\text{CH}_2-\text{O}-\text{CH}_2-\text{CH}_3 + \text{HI}$
2. $\text{CH}_3-\text{CH}_2\text{OH} + \text{CH}_3-\text{CH}_3$}
3. $\text{CH}_3-\text{CH}_2\text{OH} + \text{CH}_3-\text{CH}_3$}
4. $\text{CH}_3-\text{CH}_2\text{OH} + \text{CH}_3-\text{CH}_3$}

89. Which of the following statements is not valid for oxoacids of phosphorus?

1. All oxoacids contain tetrahedral four coordinated phosphorus
2. All oxoacids contain at least one $\text{P} = \text{O}$ unit and one $\text{P} - \text{OH}$ group
3. Orthophosphoric acid is used in the manufacture of triple superphosphate
4. Hypophosphorous acid is a diprotic acid

90. Which of the following complexes exhibits the highest paramagnetic behaviour?

1. $[\text{Co(OX)}_2(\text{OH})_2]^-$
2. $[\text{Ti(NH}_3)_6]^{3+}$
3. $[\text{V(gly)}_2(\text{OH})_2(\text{NH}_3)_2]^+$
4. $[\text{Fe(en)}(\text{bpy})(\text{NH}_3)_2]^{2+}$

Where gly = glycine, en = ethylenediamine and bpy=bipyridyl moities

(At. nos. Ti = 22, V = 23, Fe = 26, Co = 27)
91. Which one of the following is wrong about Chara?
(1) Upper oogonium and lower round antheridium.
(2) Globule and nucule present on the same plant.
(3) Upper antheridium and lower oogonium.
(4) Globule is male reproductive structure.

92. Which one of the following organelle in the figure correctly matches with its function?
(1) Rough endoplasmic reticulum, protein synthesis
(2) Rough endoplasmic reticulum, formation of glycoproteins
(3) Golgi apparatus, protein synthesis
(4) Golgi apparatus, formation of glycolipids

93. Which one of the following statements is correct?
(1) Tapetum nourishes the developing pollen
(2) Hard outer layer of pollen is called intine
(3) Sporogenous tissue is haploid
(4) Endothecium produces the miocytes

94. The incorrect statement with regard to Haemophilia is:
(1) Only single protein involved in the clotting of blood is affected
(2) It is a sex-linked disease
(3) It is a recessive disease
(4) It is a dominant disease

95. The diagram shows an important concept in the genetic implication of DNA. Fill in the blanks A to C:
DNA → mRNA → protein Proposed by
(1) A–translation B–extension C–Rosalind Franklin
(2) A–transcription B–replication C–James Watson
(3) A–translation B–transcription C–Erevin Chargaff
(4) A–transcription B–translation C–Francis Crick
96. Both, hydrarch and xerarch successions lead to:
   (1) Excessive wet conditions
   (2) Medium water conditions
   (3) Xeric conditions
   (4) Highly dry conditions

97. In Kranz anatomy, the bundle sheath cells have:
   (1) Thick walls, many intercellular spaces and few chloroplasts
   (2) Thin walls, many intercellular spaces and no chloroplasts.
   (3) Thick walls, no intercellular spaces and large number of chloroplasts.
   (4) Thin walls, no intercellular spaces and several chloroplasts.

98. In human female the blastocyst:
   (1) gets implanted into uterus 3 days after ovulation
   (2) gets nutrition from uterine endometrial secretion only after implantation
   (3) gets implanted in endometrium by the trophoblast cells.
   (4) forms placenta even before implantation

99. Variation in gene frequencies within populations can occur by chance rather than by natural selection. This is referred to as:
   (1) Genetic load
   (2) Genetic flow
   (3) Genetic drift
   (4) Random mating

100. Approximately seventy percent of carbon-dioxide absorbed by the blood will be transported to the lungs
   (1) as bicarbonate ions
   (2) in the form of dissolved gas molecules
   (3) by binding to R.B.C.
   (4) as carbamino - haemoglobin

101. Besides paddy fields, cyanobacteria are also found inside vegetative part of:
   (1) Psilotum
   (2) Pinus
   (3) Cycas
   (4) Equisetum
102. Which one of the following cellular parts is correctly described?
(1) Ribosomes - those on chloroplasts are larger (80s) while those in the cytoplasm are smaller (70s)
(2) Lysosomes-optimally active at a pH of about 8.5
(3) Thylakoids-flattened membranous sacs forming the grana of chloroplasts
(4) Centrioles - sites for active RNA synthesis

103. Examine the figures (A-D) given below and select the right option out of 1-4, in which all the four structures A, B, C and D are identified correctly:

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Runner</td>
<td>Archegoniophore</td>
<td>Synergids</td>
<td>Antheridium</td>
</tr>
<tr>
<td>Offset</td>
<td>Antheridiophore</td>
<td>Antipodals</td>
<td>Oogonium</td>
</tr>
<tr>
<td>Sucker</td>
<td>Seta</td>
<td>Megasporangium</td>
<td>Gemma cup</td>
</tr>
<tr>
<td>Rhizome</td>
<td>Sporangiophore</td>
<td>Polar cell</td>
<td>Globose</td>
</tr>
</tbody>
</table>

104. Which one of the following represents a palindromic sequence in DNA?

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5'- CATTAG - 3'</td>
<td>3' - GATAAC - 5'</td>
<td>2' - GATACC - 3'</td>
</tr>
<tr>
<td>2</td>
<td>3' - GATAAC - 5'</td>
<td>5'- CTAAG - 3'</td>
<td>3'- CCAATG - 3'</td>
</tr>
<tr>
<td>3</td>
<td>5'- GAATTC - 5'</td>
<td>4' - CTGAATCC - 3'</td>
<td>3' - CTTAAG - 5'</td>
</tr>
</tbody>
</table>

105. Which one of the following is a non-reducing carbohydrate?

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>1</td>
<td>Maltose</td>
<td>(1)</td>
<td>2</td>
</tr>
</tbody>
</table>

104. Which one of the following represents a palindromic sequence in DNA?

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<td>4' - CTGAATCC - 3'</td>
<td>3' - CTTAAG - 5'</td>
</tr>
</tbody>
</table>

105. Which one of the following is a non-reducing carbohydrate?

<p>| | | | |</p>
<table>
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<tr>
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</tr>
</thead>
<tbody>
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<td>(1)</td>
<td>2</td>
</tr>
</tbody>
</table>

104. Which one of the following represents a palindromic sequence in DNA?

<p>| | | | |</p>
<table>
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<td>3' - GATAAC - 5'</td>
<td>5'- CTAAG - 3'</td>
<td>3'- CCAATG - 3'</td>
</tr>
<tr>
<td>3</td>
<td>5'- GAATTC - 5'</td>
<td>4' - CTGAATCC - 3'</td>
<td>3' - CTTAAG - 5'</td>
</tr>
</tbody>
</table>

105. Which one of the following is a non-reducing carbohydrate?

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Maltose</td>
<td>(1)</td>
<td>2</td>
</tr>
</tbody>
</table>
106. Which one of the following is most appropriately defined?

(1) **Amensalism** is a relationship in which one species is benefited where as the other is unaffected.

(2) **Predator** is an organism that catches and kills other organism for food.

(3) **Parasite** is an organism which always lives inside the body of other organism and may kill it.

(4) Host is an organism which provides food to another organism.

107. Nitrifying bacteria :-

(1) Oxidize ammonia to nitrates

(2) Convert free nitrogen to nitrogen compounds

(3) Convert proteins into ammonia

(4) Reduce nitrates to free nitrogen

108. Jaundice is a disorder of :-

(1) Skin and eyes

(2) Digestive system

(3) Circulatory system

(4) Excretory system

109. The four sketches (A,B,C and D) given below, represent four different types of animal tissues. Which one of these is correctly identified in the options given, along with its correct location and function?

<table>
<thead>
<tr>
<th>Tissue</th>
<th>Location</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) (D) Smooth muscle tissue</td>
<td>Heart</td>
<td>Heart contraction</td>
</tr>
<tr>
<td>(2) (A) Columnar epithelium</td>
<td>Nephron</td>
<td>Secretion and absorption</td>
</tr>
<tr>
<td>(3) (B) Glandular epithelium</td>
<td>Intestine</td>
<td>Secretion</td>
</tr>
<tr>
<td>(4) (C) Collagen fibres</td>
<td>cartilage</td>
<td>Attach skeletal muscles to bones</td>
</tr>
</tbody>
</table>

106. निम्नलिखित तन में से किसका को स्वदेश के तथ्य में सर्वाधिक कितना नतीजा हो ?

(1) जे सेलॉन एंड फ्रास्ट के संबंध में है क्योंकि कई पैक्स से जाते है जहाँ हाय पैक्स तकी गया है?

(2) प्रैजेन्ट ने जे व जे है जो कि क्योंकि अन्य जेल के अन्य हाय जो जेल के लए फ्रास्ट तथा अंज में रद्धता है?

(3) प्रैजेन्ट जा जा जे है जो कि क्योंकि अन्य जेल के लए फ्रास्ट तथा अंज में रद्धता है?

(4) प्रैजेन्ट जा जे जा जा है जो कि क्योंकि अन्य जेल के लए फ्रास्ट तथा अंज में रद्धता है?
110. Given below is the representation of the extent of global diversity of invertebrates. What groups the four portions (A-D) represent respectively:

Options:

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Insects</td>
<td>Crustaceans</td>
<td>Other animal groups</td>
<td>Molluscs</td>
</tr>
<tr>
<td>2</td>
<td>Crustaceans</td>
<td>Insects</td>
<td>Molluscs</td>
<td>Other animal groups</td>
</tr>
<tr>
<td>3</td>
<td>Molluscs</td>
<td>Other animal groups</td>
<td>Crustaceans</td>
<td>Insects</td>
</tr>
<tr>
<td>4</td>
<td>Insects</td>
<td>Molluscs</td>
<td>Crustaceans</td>
<td>Other animal groups</td>
</tr>
</tbody>
</table>

111. Read the following five statements (A – E) and answer as asked next to them:

(A) In *Equisetum* the female gametophyte is retained on the parent sporophyte
(B) In *Ginkgo* male gametophyte is not independent
(C) The sporophyte in *Riccia* is more developed than that in *Polytrichum*
(D) Sexual reproduction in *Volvox* is isogamous
(E) The spores of slime molds lack cell walls

How many of the above statements are correct?

(1) Four (2) One (3) Two (4) Three

112. During mitosis ER and nucleolus begin to disappear at:

(1) Early prophase
(2) Late prophase
(3) Early metaphase
(4) Late metaphase

113. Both, autogamy and geitonogamy are prevented in:

(1) Castor (2) Maize
(3) Papaya (4) Cucumber
114. The figure below shows three steps (A, B, C) of Polymerase Chain Reaction (PCR). Select the option giving correct identification together with what it represents?

Options:
(1) C-Extension in the presence of heat stable DNA polymerase
(2) A-Annealing with two sets of primers
(3) B-Denaturation at a temperature of about 98°C separating the two DNA strands
(4) A-Denaturation at a temperature of about 50°C

115. A species facing extremely high risk of extinction in the immediate future is called:
(1) Vulnerable
(2) Endemic
(3) Critically Endangered
(4) Extinct

116. When domestic sewage mixes with river water:
(1) The increased microbial activity releases micro-nutrients such as iron.
(2) The increased microbial activity uses up dissolved oxygen.
(3) The river water is still suitable for drinking as impurities are only about 0.1%
(4) Small animals like rats will die after drinking river water.
117. Study the pathway given below:

In which of the following options correct words for all the three blanks A, B and C are indicated?

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fixation</td>
<td>Transamination</td>
<td>Regeneration</td>
</tr>
<tr>
<td>2</td>
<td>Fixation</td>
<td>Decarboxylation</td>
<td>Regeneration</td>
</tr>
<tr>
<td>3</td>
<td>Carboxylation</td>
<td>Decarboxylation</td>
<td>Reduction</td>
</tr>
<tr>
<td>4</td>
<td>Decarboxylation</td>
<td>Reduction</td>
<td>Regeneration</td>
</tr>
</tbody>
</table>

118. Fructose is absorbed into the blood through mucosa cells of intestine by the process called:

(1) active transport
(2) facilitated transport
(3) simple diffusion
(4) co-transport mechanism

119. Choose the correctly matched pair:

(1) Inner lining of salivary ducts – Ciliated epithelium
(2) Moist surface of buccal cavity – Glandular epithelium
(3) Tubular parts of nephrons – Cuboidal epithelium
(4) Inner surface of bronchioles – Squamous epithelium
120. In which one of the following, the genus name, its two characters and its phylum are not correctly matched, whereas the remaining three are correct?

<table>
<thead>
<tr>
<th>Genus Name</th>
<th>Two characters</th>
<th>Phylum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sycon</td>
<td>(a) Pore bearing (b) Canal system</td>
<td>Porifera</td>
</tr>
<tr>
<td>Periplaneta</td>
<td>(a) Jointed appendages (b) Chitinous exoskeleton</td>
<td>Arthropoda</td>
</tr>
<tr>
<td>Pila</td>
<td>(a) Body segmented (b) Mouth with Radula</td>
<td>Mollusca</td>
</tr>
<tr>
<td>Asterias</td>
<td>(a) Spiny skinned (b) Water vascular system</td>
<td>Echinodermata</td>
</tr>
</tbody>
</table>

121. *Selaginella* and *Salvinia* are considered to represent a significant step toward evolution of seed habit because:

1. Embryo develops in female gametophyte which is retained on parent sporophyte
2. Female gametophyte is free and gets dispersed like seeds.
3. Female gametophyte lacks archegonia
4. Megaspores possess endosperm and embryo surrounded by seed coat.

122. The enzyme recombinase is required at which stage of meiosis:

1. Pachytene
2. Zygotene
3. Diplotene
4. Diakinesis

123. In plant breeding programme, the entire collection (of plants/seeds) having all the diverse alleles for all genes in a given crop is called:

1. germplasm collection
2. selection of superior recombinants
3. cross-hybridisation among the selected parents.
4. evaluation and selection of parents

124. Biologics (gene-gun) is suitable for:

1. Constructing recombinant DNA by joining with vectors
2. DNA finger printing
3. Disarming pathogen vectors
4. Transformation of plants cells

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120. निम्नलिखित तंत्र में से किसका में एक जैनसना म., उ सब में दो विशेष ग्रंथ ताले सहित ताले नहीं करे। इस फा. इलाम को गाला मिला या गया जाकरी या तो नहीं है ?

<table>
<thead>
<tr>
<th>जैनसना म.</th>
<th>दो लक्षण</th>
<th>फा. इलाम</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) सेलाजिनेला</td>
<td>(a) फ्रॉट्रिडिया तो (b) ना लगा जाता</td>
<td>पेस्टर फा. या</td>
</tr>
<tr>
<td>(2) एस्टरीक्स</td>
<td>(a) संधित झंडा लगा (b) का इन तो या चूहा बाल</td>
<td>आ का च। ला जा ता</td>
</tr>
<tr>
<td>(3) पिला</td>
<td>(a) में देखा रूढ़ू का (b) रे मुंदा से युक्त चम</td>
<td>मात्र ता एम</td>
</tr>
<tr>
<td>(4) ऐस्टरिया</td>
<td>(a) शूरी लाइ वन का (b) जा से हा हक कर ता</td>
<td>इस इन्डे में टा</td>
</tr>
</tbody>
</table>

121. सर्झर जोन किसी ज्ञानक के विशिष्ट विवरणों का को ?

- किसी कयान महत्वपूर्ण व्यक्ति की घटना?
  1. पिया नाम गया मीटे फाइट में विकसित होते हैं जो रूढ़ू दर्शन प्रमाण बना होता है।
  2. मीटे गाई मीटे फाइट रवित संचार होता है तथा तो वी रेडर रिश्ता जाता है।
  3. मीटे गाई मीटे फाइट में रेडर नियम नहीं होता?

122. लिस्टिया केन जापान के यूरोप की चिकित्सा का भूमिका कहते हैं?

- पहला में एक संगीतीय साथी नीचे वन के रूढ़ तंत्र पर करते हैं?
  1. एक चित्र न (४१६ लाल)
  2. ङ्ग गाई डी न (पुरा नील)
  3. डि फ्लोर न (डिप्लो)
  4. डाई आ लाइ रो फिर (स पायथम)

123. पदार्थ जन्मा गा। जाते भी किसी सफाई के रूढ़ू जो वने अंदीले के संग संबंध है (पहले भी / वैश्वत) का ?

- जानवर (प) पाल (म) संग है?
  1. जानवर (प) पाल (म) संग है?
  2. एकी पुष्ट गुमन गया जाकर चला?
  3. करनल जाकर के बीच पहले संबंध करता?
  4. जानवर और पुष्ट या बना या रूढ़ा?

124. आ या लिस्टिया के (वजन गाई ला जा री) चिकित्सा लिफ या विवृति करता है?

- (1) से वापस जाने के लिए वन घर तो करता?
  1. से वापस के ठी-ड एयर में बनाना।
  2. DNA फिट गरे दिग्दे री।
  3. गो जाकर से वापस जाने पर नियमिता करना?
  4. पदार्थ के चित्र के अंदे वापस उत्तम।
125. Match the following and select the correct option:

<table>
<thead>
<tr>
<th></th>
<th>(a)</th>
<th>(b)</th>
<th>(c)</th>
<th>(d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a)</td>
<td>Earthworm</td>
<td>(i)</td>
<td>Pioneer species</td>
<td>(iv)</td>
</tr>
<tr>
<td>(b)</td>
<td>Succession</td>
<td>(ii)</td>
<td>Detritivore</td>
<td>(iii)</td>
</tr>
<tr>
<td>(c)</td>
<td>Ecosystem service</td>
<td>(iii)</td>
<td>Natality</td>
<td>(ii)</td>
</tr>
<tr>
<td>(d)</td>
<td>Population growth</td>
<td>(iv)</td>
<td>Pollination</td>
<td>(i)</td>
</tr>
</tbody>
</table>

126. dB is a standard abbreviation used for the quantitative expression of:

(1) A certain pesticide
(2) The density of bacteria in a medium
(3) A particular pollutant
(4) The dominant Bacillus in a culture

127. At which stage of HIV infection does one usually show symptoms of AIDS:

(1) Within 15 days of sexual contact with an infected person.
(2) When the infected retro virus enters host cells.
(3) When HIV damages large number of helper T-Lymphocytes.
(4) When the viral DNA is produced by reverse transcriptase.

128. A fall in glomerular filtration rate (GFR) activates:

(1) adrenal medulla to release adrenaline
(2) posterior pituitary to release vasopressin
(3) juxta glomerular cells to release renin
(4) adrenal cortex to release aldosterone

129. Injury to adrenal cortex is not likely to affect the secretion of which one of the following?

(1) Cortisol
(2) Aldosterone
(3) Both Androstenedione and Dehydroepiandrosterone
(4) Adrenaline

125. निम्नलिखित तक तुम खे लित की किसको विकट प चु निए

<table>
<thead>
<tr>
<th></th>
<th>(a)</th>
<th>(b)</th>
<th>(c)</th>
<th>(d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a)</td>
<td>के चु ख</td>
<td>(i)</td>
<td>आग गा मो जल</td>
<td>(iv)</td>
</tr>
<tr>
<td>(b)</td>
<td>अनु क्रम</td>
<td>(ii)</td>
<td>अरुड़ा हार ती</td>
<td>(iii)</td>
</tr>
<tr>
<td>(c)</td>
<td>परिसर 81 तिक त नर मिही</td>
<td>(iii)</td>
<td>ज मदर</td>
<td>(ii)</td>
</tr>
<tr>
<td>(d)</td>
<td>जासें खा वृ मँड</td>
<td>(iv)</td>
<td>पा गाम</td>
<td>(i)</td>
</tr>
</tbody>
</table>
130. Which one of the following statement is totally wrong about the occurrence of notochord while the other three are correct?

1. It is present through life in Amphioxus
2. It is present only in larval tail in Ascidians
3. It is replaced by a vertebral column in adult frog
4. It is absent throughout life in humans from the very beginning

131. Given below is the diagram of a bacteriophage. In which one of the options all the four parts A, B, C and D are correct?

Options:

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sheath</td>
<td>Collar</td>
<td>Head</td>
<td>Tail fibres</td>
</tr>
<tr>
<td>2</td>
<td>Head</td>
<td>Sheath</td>
<td>Collar</td>
<td>Tail fibres</td>
</tr>
<tr>
<td>3</td>
<td>Collar</td>
<td>Tail fibres</td>
<td>Head</td>
<td>Sheath</td>
</tr>
<tr>
<td>4</td>
<td>Tail fibres</td>
<td>Head</td>
<td>Sheath</td>
<td>Collar</td>
</tr>
</tbody>
</table>

132. Phyllode is present in:

1. Australian Acacia
2. Opuntia
3. Asparagus
4. Euphorbia

133. Which one of the following is a case of wrong matching?

1. Micropropagation-Invitro production of plants in large numbers
2. Callus-Unorganised mass of cells produced in tissue culture
3. Somatic hybridization - Fusion of two diverse cells
4. Vector DNA- Site for t-RNA synthesis

134. A certain road accident patient with unknown blood group needs immediate blood transfusion. His one doctor friend at once offers his blood. What was the blood group of the donor?

1. Blood group O
2. Blood group A
3. Blood group B
4. Blood group AB

135. Secondary productivity is rate of formation of new organic matter by:

1. Decomposer
2. Producer
3. Parasite
4. Consumer
136. Dr. F. Went noted that if coleoptile tips were removed and placed on agar for one hour, the agar would produce a bending when placed on one side of freshly-cut coleoptile stumps. Of what significance is this experiment?
(1) It made possible the isolation and exact identification of auxin.
(2) It is the basis for quantitative determination of small amounts of growth-promoting substances.
(3) It supports the hypothesis that IAA is auxin.
(4) It demonstrated polar movement of auxins.

137. Which one of the following in not a property of cancerous cells whereas the remaining three are?
(1) They divide in an uncontrolled manner
(2) They show contact inhibition
(3) They compete with normal cells for vital nutrients
(4) They do not remain confined in the area of formation

138. Figure shows human urinary system with structures labelled A to D. Select option which correctly identifies them and gives their characteristics and/or functions.

A - Kidney
B - Pelvis
C - Medulla
D - Cortex

(1) D-Cortex - outer part of kidney and do not contain any part of nephrons
(2) A-Adrenal gland - located at the anterior part of kidney. Secrete Catecholamines which stimulate glycogen breakdown
(3) B-Pelvis - broad funnel shaped space inner to hilum, directly connected to loops of Henle
(4) C-Medulla-inner zone of kidney and contains complete nephrons
139. Select the correct matching of a hormone, its source and function.

<table>
<thead>
<tr>
<th>Hormone</th>
<th>Source</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Norepinephrine</td>
<td>Adrenal medulla</td>
<td>Increases heart beat, rate of respiration and alertness</td>
</tr>
<tr>
<td>Glucagon</td>
<td>Beta-cells of islets of langerhans</td>
<td>Stimulates glycolysis</td>
</tr>
<tr>
<td>Prolactin</td>
<td>Posterior pituitary</td>
<td>Regulates growth of mammary glands and milk formation in females</td>
</tr>
<tr>
<td>Vasopressin</td>
<td>Posterior pituitary</td>
<td>Increases loss of water through urine</td>
</tr>
</tbody>
</table>

140. Which one of the following pairs of animals comprises ‘jawless fishes’?
(1) Guppies and hag fishes
(2) Lampreys and eels
(3) Mackerals and Rohu
(4) Lampreys and hag fishes

141. Thermococcus, Methanococcus and Methanobacterium exemplify :-
(1) Bacteria whose DNA is relaxed or positively supercoiled but which have a cytoskeleton as well as mitochondria
(2) Bacteria that contain a cytoskeleton and ribosomes
(3) Archaeabacteria that contain protein homologous to eukaryotic core histones
(4) Archaeabacteria that lack any histones resembling those found in eukaryotes but whose DNA is negatively supercoiled.

142. How many plants in the list given below have composite fruits that develop from an inflorescence?
Walnut, poppy, radish, fig, pineapple, apple, tomato, mulberry
(1) Two (2) Three (3) Four (4) Five

143. An analysis of chromosomal DNA using the Southern hybridization technique does not use :-
(1) Electrophoresis (2) Blotting (3) Autoradiography (4) PCR
144. ABO blood groups in humans are controlled by the gene I. It has three alleles – IA, IB and i. Since there are three different alleles, six different genotypes are possible. How many Phenotypes can occur?

1. Two  
2. Three  
3. One  
4. Four

145. Which one of the following processes during decomposition is correctly described?

1. Leaching – Water soluble inorganic nutrients rise to the top layers of soil  
2. Fragmentation – Carried out by organisms such as earthworm  
3. Humification – Leads to the accumulation of a dark coloured substance humus which undergoes microbial action at a very fast rate  
4. Catabolism – Last step in the decomposition under fully anaerobic condition

146. Select the option which is not correct with respect to enzyme action:

1. Substrate binds with enzyme at its active site.  
2. Addition of lot of succinate does not reverse the inhibition of succinic dehydrogenase by malonate.  
3. A non-competitive inhibitor binds the enzyme at a site distinct from that which binds the substrate.  
4. Malonate is a competitive inhibitor of succinic dehydrogenase.

147. Which one of the following options gives the correct matching of a disease with its causative organism and mode of infection.

<table>
<thead>
<tr>
<th>Disease</th>
<th>Causative Organisms</th>
<th>Mode of Infection</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Malaria</td>
<td><em>Plasmodium vivax</em></td>
<td>Bite of male Anopheles Mosquito</td>
</tr>
<tr>
<td>(2) Typhoid</td>
<td><em>Salmonella typhi</em></td>
<td>With inspired air</td>
</tr>
<tr>
<td>(3) Pneumonia</td>
<td><em>Streptococcus pneumoniae</em></td>
<td>Droplet infection</td>
</tr>
<tr>
<td>(4) Elephantiasis</td>
<td><em>Wuchereria bancrofti</em></td>
<td>With infected water and food</td>
</tr>
</tbody>
</table>

Time Management is Life Management
148. A person entering an empty room suddenly finds a snake right in front on opening the door. Which one of the following is likely to happen in his neuro-hormonal control system?

1. Hypothalamus activates the parasympathetic division of brain
2. Sympathetic nervous system is activated releasing epinephrin and norepinephrin from adrenal cortex
3. Sympathetic nervous system is activated releasing epinephrin and norepinephrin from adrenal medulla
4. Neurotransmitters diffuse rapidly across the cleft and transmit a nerve impulse

149. Parts A, B, C and D of the human eye are shown in the diagram. Select the option which gives correct identification along with its functions/characteristics:

1. D- Choroid - its anterior part forms ciliary body
2. A - Retina - contains photo receptors-roses and cones
3. B - Blind spot - has only a few rods and cones
4. C - Aqueous chamber-reflects the light which does not pass through the lens

150. In humans, blood passes from the post caval to the diastolic right atrium of heart due to :-

1. stimulation of the sino auricular node
2. pressure difference between the post caval and atrium
3. pushing open of the venous valves
4. suction pull

151. Which one of the following pairs is wrongly matched?

1. Viroids - RNA
2. Mustard - Synergids
3. Ginkgo - Archegonia
4. Salvinia - Prothallus

148. एक लड़के बैठे तो वहाँ ही देखा ली कमरे में घुम रहा है तो दरवाजे खोले लेने ही उसे अभ्यर्थक खुशी पतनी कर मने जब आ तो जब इसे उसे खुश पता लाकर उसके तंत्र जीता - हमारे निम्न तंत्र तंत्र लेने वाले यह है?

1. हमारे यह एक लेने मस्तिष्क का फाउन जीता 711 गए हो जाएगा?
2. अनुपम कर ये तंत्र जीते जा सकता है कि यह एड. 711 नारे एड. 711 नारा-एड. 711 नरलय दुल्ला ले हो?
3. अनुपम कर ये तंत्र जीते जा सकता है कि यह एड. 711 नारा-एड. 711 नरलय दुल्ला ले हो?
4. तेज से दाएं शे पर कर जाते और एक शे जीते अंतर गए वाला संबंध किया है?

149. मान लें ज के चार B, C और D अंरे खे देशएं एं गए हैं। 711 गो जब कही फूला न के सा 711 - सा 711 उसके बायं वे विकल्प गये चुनिए?

1. D- घाव तकल्लु (बाएं) यह इड. इड. अमला 711 गो फूला वा बना ता है?
2. A - रे आई बाय बेबा है - नह वा या (राई इड.) अंरे वाय एँ नारा हो ता है?
3. ब - अं - बिंदु, इसें के वलब ला का है यह रेत कुहू?
4. शेबु जी रहा उ न सप चा को या बर्ता तकर दे ता है जे से संस हो कहु जाने नही है?

150. मान लें भागें, भाग तमा फूला धार या से अनुष्क सिध्दांथ अल्य दें मे के पहुंच ना किसके बायं रहे ता हैं?

1. हिंदु - अल्य दें नाला आड. और जा
2. फूल महा धार ता भी अल्य दें के चाल चा अंतर और खह ता?
3. हिंदु चाल वे का वाला दे कर खुल ला जाए
4. चूड गा भिंदु चा बा

151. निम्न पहिले ते मे के नस एक जल्दी 1 गलत मिला गया है?

1. वाङ या इड. री. 
2. सल्ले - सा या शिक का ता?
3. जिंगे - रंगे या निम्न
4. वाक विनय - मे था लस
152. The correct floral formula of chilli is :-

(1) $\mathcal{Q} K (5) C (5) A (2) G$
(2) $\mathcal{Q} K (5) C (5) A (2) G$
(3) $\mathcal{Q} K (5) C (5) A (2) G$
(4) $\mathcal{Q} K (5) C (5) A (2) G$

153. In a population of 1000 individuals 360 belong to genotype AA, 480 to Aa and the remaining 160 to aa. Based on this data, the frequency of allele A in the population is :-

(1) 0.4
(2) 0.5
(3) 0.6
(4) 0.7

154. Yeast is used in the production of :-

(1) Bread and beer
(2) Cheese and butter
(3) Citric acid and lactic acid
(4) Lipase and pectinase

155. Identify the likely organisms (a), (b), (c) and (d) in the food web shown below:

(a) lion
(b) foxes
(c) snakes
(d) hawks

156. Which of the following criteria does not pertain to facilitated transport?

(1) Uphill transport
(2) Requirement of special membrane proteins
(3) High selectivity
(4) Transport saturation

157. The cell-mediated immunity inside the human body is carried out by:

(1) Erythrocytes
(2) T-lymphocytes
(3) B-lymphocytes
(4) Thrombocytes
158. Injury localized to the hypothalamus would most likely disrupt:
(1) short-term memory.
(2) co-ordination during locomotion.
(3) executive functions, such as decision making.
(4) regulation of body temperature.

159. Elbow joint is an example of:
(1) Ball and socket joint
(2) Pivot joint
(3) Hinge joint
(4) Gliding joint

160. The diagram given here is the standard ECG of a normal person. The P-wave represents:
(1) End of systole
(2) Contraction of both the atria
(3) Initiation of the ventricular contraction
(4) Beginning of the systole

161. Which one of the following is not a correct statement?
(1) Key is taxonomic aid for identification of specimens
(2) Herbarium houses dried, pressed and preserved plant specimens
(3) Botanical gardens have collection of living plants for reference
(4) A museum has collection of photographs of plants and animals

162. The common bottle cork is a product of:
(1) Xylem
(2) Vascular Cambium
(3) Dermatogen
(4) Phellogen

163. A man whose father was colour blind marries a woman who had a colour blind mother and normal father. What percentage of male children of this couple will be colour blind?
(1) 25%
(2) 0%
(3) 50%
(4) 75%
164. Study the pedigree chart given below:

What does it show?
1. Inheritance of a recessive sex-linked disease like haemophilia
2. Inheritance of a sex-linked inborn error of metabolism like phenylketonuria
3. Inheritance of a condition like phenylketonuria as an autosomal recessive trait
4. The pedigree chart is wrong as this is not possible

165. In an area where DDT had been used extensively, the population of birds declined significantly because
1. cobras were feeding exclusively on birds
2. many of the birds' eggs laid did not hatch
3. bird stopped laying eggs
4. earthworms in the area got eradicated

166. The three boxes in this diagram represent the three major biosynthetic pathways in aerobic respiration. Arrows represent net reactants or products.

Arrow numbers 4, 8 and 12 can all be:
1. FAD+ or FADH₂
2. NADH
3. ATP
4. H₂O

167. In humans, at the end of the first meiotic division, the male germ cells differentiate into the:
1. Spermatids
2. Spermatozoa
3. Primary spermatocytes
4. Secondary spermatocytes
168. The eye of octopus and eye of cat show different patterns of structure, yet they perform similar function. This is an example of:
(1) Analogous organs that have evolved due to divergent evolution
(2) Homologous organs that have evolved due to convergent evolution
(3) Homologous organs that have evolved due to divergent evolution
(4) Analogous organs that have evolved due to convergent evolution

169. The H-zone in the skeletal muscle fibre is due to:
(1) extension of myosin filaments in the central portion of the A-band
(2) the absence of myofibrils in the central portion of A-band
(3) the central gap between myosin filaments in the A-band
(4) the central gap between actin filaments extending through myosin filaments in the A-band

170. Select the correct statement from the ones given below with respect to *Periplaneta americana*:
(1) There are 16 very long Malpighian tubules present at the junctions of midgut and hindgut.
(2) Grinding of food is carried out only by the mouth parts
(3) Nervous system located dorsally, consists of segmentally arranged ganglia joined by a pair of longitudinal connectives
(4) Males bear a pair of short thread-like anal styles

171. The Golgi complex plays a major role:
(1) in post translational modification of proteins and glycosylation of lipids
(2) in trapping the light and transforming it into chemical energy
(3) in digesting proteins and carbohydrates
(4) as energy transferring organelles

172. You are given a fairly old piece of dicot stem and a dicot root. Which of the following anatomical structures will you use to distinguish between the two?
(1) Secondary xylem
(2) Secondary phloem
(3) Protoxylem
(4) Cortical cells
173. Which of the following statements is not true of two genes that show 50% recombination frequency?
(1) If the genes are present on the same chromosome, they undergo more than one crossover in every meiosis
(2) The genes may be on different chromosomes
(3) The genes are tightly linked
(4) The genes show independent assortment

174. Select the correct option:

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<th>Direction of RNA synthesis</th>
<th>Direction of reading of the template DNA strand</th>
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<td>(2) 3’—5’</td>
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<td>(4) 3’—5’</td>
<td>3’—5’</td>
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</tbody>
</table>

175. The logistic population growth is expressed by the equation:

(1) \( \frac{dN}{dt} = rN \left( \frac{N-K}{N} \right) \)
(2) \( \frac{dt}{dN} = Nr \left( \frac{K-N}{K} \right) \)
(3) \( \frac{dN}{dt} = rN \left( \frac{K-N}{K} \right) \)
(4) \( \frac{dN}{dt} = rN \)

176. Which one of the following is wrong statement?
(1) Phosphorus is a constituent of cell membranes, certain nucleic acids and all proteins
(2) Nitrosomonas and Nitrobacter are chemoautotrophs
(3) Anabaena and Nostoc are capable of fixing nitrogen in free-living state also
(4) Root nodule forming nitrogen fixers live as aerobes under free-living conditions

177. In the human female, menstruation can be deferred by the administration of:
(1) FSH only
(2) LH only
(3) Combination of FSH and LH
(4) Combination of estrogen and progesterone
178. The process by which organisms with different evolutionary history evolve similar phenotypic adaptation in response to a common environmental challenge, is called:
(1) Adaptive radiation
(2) Natural selection
(3) Convergent evolution
(4) Non-random evolution

179. The figure shows a diagrammatic view of human respiratory system with labels A, B, C and D. Select the option which gives correct identification and main function and/or characteristic:

![Diagram of human respiratory system]

(1) D – Lower end of lungs – diaphragm pulls it down during inspiration
(2) A – trachea - long tube supported by complete cartilaginous rings for conducting inspired air
(3) B – pleural membrane - surround ribs on both sides to provide cushion against rubbing
(4) C – Alveoli - thin walled vascular bag like structures for exchange of gases

180. In cloning of cattle a fertilized egg is taken out of the mother's womb and:-
(1) From this upto eight identical twins can be produced
(2) The egg is divided into 4 pairs of cells which are implanted into the womb of other cows
(3) In the eight cell stage, cells are separated and cultured until small embryos are formed which are implanted into the womb of other cows.
(4) In the eight cell stage the individual cells are separated under electrical field for further development in culture media

Your Target is to secure Good Rank in Pre-Medical 2016
<table>
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**CORRECTION IN MAJOR TEST**

- **Test Date:** 22.02.2016
- **PHASE:** ML A, ML B, ML C, ML D, ML E
- **Q. 150, 176**
- **A. Bonus, Bonus**

- **Test Date:** 29.02.2016
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- **Q. 44, 169**
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- **Test Date:** 08.03.2016
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- **Q. 130**
- **A. Bonus**

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- **A. Bonus, Bonus**

- **Test Date:** 15.03.2016
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- **A. 1, 4, 2**

- **Test Date:** 20.03.2016
- **PHASE:** ML I, ML J, MAZ C
- **Q. 81**
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- **Test Date:** 22.03.2016
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- **Test Date:** 25.03.2016
- **PHASE:** ML A, ML B, ML C, ML D, ML E
- **Q. 45, 173**
- **A. Bonus**

- **Test Date:** 26.03.2016
- **PHASE:** ML A, ML B, ML C, ML D, ML E
- **Q. 162**
- **A. Bonus**

- **Test Date:** 29.03.2016
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- **Q. 57, 81**
- **A. Bonus**

- **Test Date:** 30.03.2016
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- **Q. 108**
- **A. Bonus**

- **Test Date:** 03.04.2016
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- **Q. 83**
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- **Test Date:** 17.04.2016
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- **Q. 3, 6, 70**
- **A. Bonus**